AF

TRANSMITTAL LETTER
(General - Patent Pending)

Docket No. 121027-040

In Re Application Of: **Toshio KOBAYASHI et al.**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/766,275	January 19, 2001	Jennifer Boyd	35684	1771	

Title:

ELASTICALLY STRETCHABLE COMPOSITE SHEET AND PROCESS FOR MAKING THE SAME

COMMISSIONER FOR PATENTS:

Transmitted herewith is:

Revised Brief on Appeal (original and two (2) copies)
Exhibit "A"
Exhibit "B"
Return Receipt Post Card

in the above identified application.

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Michael S. Gzybowski

Signature

Dated: **August 8, 2005**

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August 8, 2005
(Date)

Michael S. Gzybowski

Signature of Person Mailing Correspondence

Michael S. Gzybowski

Typed or Printed Name of Person Mailing Correspondence

cc:

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No. 121027-040

In Re Application Of: **Toshio KOBAYASHI et al.**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/766,275	January 19, 2001	Jennifer Boyd	35684	1771	

Invention:

ELASTICALLY STRETCHABLE COMPOSITE SHEET AND PROCESS FOR MAKING THE SAME

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

The fee for filing this Appeal Brief is:

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- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
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cc:

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit:	1771
Attorney Docket No.:	121027- 040
Applicant:	Toshio KOBAYASHI et al.
Invention:	ELASTICALLY STRETCHABLE COMPOSITE SHEET AND PROCESS FOR MAKING THE SAME
Serial No:	09/766,275
Filed:	January 19, 2001
Examiner:	Jennifer Boyd

Certificate Under 37 CFR 1.8(a)

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on August 8, 2005

Michael S. Gzybowski

BRIEF ON APPEAL

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Further to Appellants' Notice of Appeal filed February 22, 2005 in connection with the above-identified application, Appellants submit the present Brief on Appeal.

REAL PARTY IN INTEREST

Appellants assigned this application to Uni-Charm Corporation in an assignment which was executed by the inventors on June 19, 2001, and recorded in the United States Patent and Trademark

Office on July 23, 2001 at Reel No. 012000 and Frame No. 0977.

RELATED APPEALS AND INTERFERENCES

There are no related cases involved in any appeal procedures or Interferences.

STATUS OF CLAIMS

Claims 1-3, 6 and 7 are pending in this application. Claims 1-3 and 7 stand under Final Rejection, from which rejection of claims 1-3 and 7 this appeal is taken. Claim 4 and 5 are directed to a non-elected invention. The outstanding rejection of claim 6 was overcome by filing a Terminal Disclaimer. No other claim(s) is/are pending.

STATUS OF AMENDMENTS

No Amendments after Final were filed in this application.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to a composite sheet 1 that includes an elastic sheet 3 having a stretchability in at least one of two directions that are orthogonal to each other and a fibrous assembly 2 in the form of a sheet having a stretchability in one of the at least two directions and joined to at least one surface of the elastic sheet. The elastic sheet 3 is discussed in the paragraph bridging pages 10 and 11 of appellants' original specification. The fibrous assembly 2 is discussed in the paragraph bridging pages 9 and 10 of appellants' original specification.

As discussed in the third and fourth full paragraphs on page 9 of appellants' specification, the fibrous assembly comprises a plurality of fibers and has an inelastic stretchability and is joined to the elastic sheet at binding spots to form a joined composite sheet structure. The resulting composite sheet structure is thereafter stretched so as to change the dimensions of the fibers in the fibrous assembly 2 and the elastic stretchability of the composite sheet, as discussed in the paragraph bridging pages 15 and 16 of appellants' original specification. As a result of this stretching process which changes the dimension of the fibers in the fibrous assembly, the fibers of the elastic sheet 3 that may be heat-sealed or mechanically entangled one with another are almost entirely separated one from another except the regions in which they were heat-sealed at the binding spots 4. In addition, as a result of this stretching process which changes the dimension of the fibers in the fibrous assembly, the composite sheet has a high stretchability as well as a comfortable touch.

As discussed in the paragraph bridging pages 9 and 10 of appellants' specification, the binding spots 4 are arranged intermittently along two directions and the fibrous assembly comprises fibers that are curved between adjacent pairs of the binding spots along one of the two directions.

As discussed in the paragraph bridging pages 9 and 10 of appellants' specification, the fibers 6 of the fibrous assembly 2 comprise ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

As discussed on page 10, lines 14-16 of appellants' specification, the continuous fibers 6 can further comprise a propylene homopolymer from greater than 0% to 90% by weight.

As discussed in the paragraph bridging pages 9 and 10 of appellants' specification, the elastic sheet 3 and the fibrous assembly 2 are heat-sealed with each other at the binding spots 4.

The stretchable web of the present invention is made by a process (depicted in Fig. 2 and discussed on pages 12-17 of appellants' specification) that involves the steps of:

a) providing a first web 41 that is inelastically stretchable in one direction,

b) providing a second web 42 that is elastically stretchable by at least 80% in the one direction;

c) continuously feeding the first web 41 in the one direction;

d) continuously feeding the second web 42 in the one direction and placing the second web 42 upon first web 41;

e) joining the first and second webs 41 and 42 having been placed upon each other in step d) to each other intermittently in the one direction and in a direction orthogonal to the one direction (at least in the one direction) to form a composite web 43;

f) stretching the first and second webs 41 and 42 having been joined to each other in step e) in the one direction and the direction orthogonal to the one direction (at least in the one direction) within an elasticity limit of the second web 42 and within a breaking extension of the first web 41 so as to change the dimensions of the fibers in the first web 41 and the elastic stretchability of the composite web 43; and

g) allowing the first and second webs 41 and 42 having been stretched in step f) contract to obtain the composite sheet 44.

(An alternative process that involves the same steps is shown in Fig. 3).

As discussed in the paragraph bridging pages 9 and 10 of appellants' specification, the fibers 35 of the first web 41 comprise ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

As discussed on page 13, lines 14-18 of appellants' original specification the fibers 35 of the first web 41 have a breaking extension of at least 150%.

As discussed in the paragraph bridging pages 13 and 14, the second web 42 is made of fibers 40 of a thermoplastic resin.

As discussed on pages 23 and 24 of appellants' specification, the individual fibers forming the fibrous web are plastically deformed and thinned, on one hand, and dissolved from heat-sealing or entangling effect as the composite sheet is stretched once in the course of making this composite sheet. With a consequence, a relatively small force required to stretch the elastic stretchable web alone is sufficient to initially stretch this composite sheet. In this way, the composite sheet has a high stretchability as well as a comfortable touch.

ISSUES

Whether claims 1 - 3 and 7 are properly rejected under 35 U.S.C. §103(a) as being unpatentable over Strack et al in view of Morman.

ARGUMENT

Appellant respectfully urges that claims 1-3 and 7 patentably distinguish from the applied reference combination as the claimed subject matter would not have been obvious within the meaning of 35 U.S.C. §103(a).

The Examiner has relied upon Strack et al. as teaching:

> ...a laminate material comprising a non-woven web elastomeric web having at least one web of textile material discontinuously bonded to each side (Abstract).

The Examiner states that Strack et al.:

> ...describes the laminate with at least two textile webs, a non-elastic textile web with stretch and recovery characteristics, and a textile web with non-woven elastomeric web properties (column 5, line 58-67).

The Examiner notes that Strack et al. describes various kinds of elastomeric web material "such as HYREL."

The Examiner further notes that appellants' claimed invention only requires that the elastic sheet be stretchable in at least one of the two directions that are orthogonal to each other and therefore, according to the Examiner, HYTEL meets the elongation requirements of the claims.

The Examiner has further relied upon Strack et al. as using an adhesive to laminate the webs together.

The Examiner concedes that Strack et al. fails to teach that the component fibers of the sheet having inelastic stretchability comprise ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

The Examiner has accordingly relied upon Morman as describing a multi-directional stretch composite elastic material comprising at least one sheet which is stretched and one necked (non-elastic) material, which are joined together in at least three locations.

The Examiner noted that Morman describes that:

> ...the non-elastic materials are nonwovens made of polyolefins and similar polymer including ethylene copolymers, propylene copolymers and butene copolymers (column 4, lines 44 – 64).

In combining the teachings of Strack et al. and Morman the Examiner takes the position that:

> It would have been obvious...to create the non-elastic textile web of Strack with the copolymer combination of Morman motivated by the desire to improve resilience, stretch and recovery of the composite.

On page 6 of the Final Official Action the Examiner concedes that the combination of Strack et al. and Morman fails to teach that the inelastic material comprises ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

Nevertheless the Examiner has relied upon the holding in *In re Boesch* as supporting the Examiner's position that "one would have been motivated to optimize the amounts of ethylene or the amounts of ethylene and butene in order to have a properly strong and resilient composite web." (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

On page 3 of the Official Action of the Examiner concedes that Strack et al.

> ...fails to disclose that the propylene homopolymer is present in the amount of greater than 0 to 99% by weight as required by claim 2.

The Examiner further states that:

> Additionally, Strack fails to teach that the component fibers of the sheet having inelastic stretchability comprises ethylene/propylene copolymer containing ethylene at 0.5 - 10% by weight, ethylene/propylene/butane containing ethylene at 0.5 - 10% by weight and butane at 0.5 - 15% by weight, or a mixture thereof at 100 - 10% by weight as required by claim 7.

The Examiner further states that in Morman the necked material can also comprise polypropylene and can comprise a mixture of two or more fibers.

The Examiner concludes:

> Therefore, in one embodiment, fibers can comprise ethylene/propylene/butene copolymers as one fiber type and polypropylene as another fiber type.

In which case the Examiner notes:

> It should be noted that if polypropylene is present in any amount, it will meet Applicant's requirement of greater than 0%.

In combining the teachings of Strack et al. and Morman the Examiner takes the position that:

> It would have been obvious...to create the non-elastic textile web of Strack with the copolymer and polypropylene fiber combination of Morman motivated by the desire to improve resilience, stretch and recovery of the composite.

The Examiner concedes that her proposed combination of Strack et al. in view of Morman fails to teach that the inelastic material comprises ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

Nevertheless the Examiner has set forth the following analysis:

> It should be noted that the amount of ethylene or ethylene and butene is a result effective variable. For example, as the amount of ethylene increases, the material possess more characteristics similar to ethylene, etc.

From this reasoning the Examiner concludes:

> It would have been obvious....to create the inelastic material comprising ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

The Examiner has specifically relied upon the holding in *In re Boesch* as supporting this position (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)). (Attached as Exhibit "A")

The Examiner was asked to review the Board of Patent Appeals and Interferences opinion in *Ex parte Roland Barth* (Appeal No. 1998-0982; Application No. 08/399,715) (Attached as Exhibit "B").

In *Barth*, the Board cited *Boesch*, noting that:

> The discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art and, hence obvious.
> It is clear that the optimization referred to in *Boesch* is the optimization of a known parameter or "effective variable in a known process."

The Board further stated that "...in all authorities known to us, the optimization relates to a range or variable."

In the present situation, the Examiner has taken the position that "the amount of ethylene or ethylene and butene is a result effective variable."

Specifically the Examiner states that "as the amount of ethylene increases, the material will possess more characteristics similar to ethylene, *etc.*"

The Examiner's position would be supported by the Board's holding in *Barth* if the art recognizes that ethylene is a "result effective variable" in a "known process."

At column 7, lines 1-12 Morman teaches:

> The neckable material 12 may be made of fiber forming polymers such as, for example, polyolefins. Exemplary polyolefins include one or more of polyethylene, polypropylene, polybutylene, poly(methyl pentene), ethylene copolymers, propylene copolymers, and butylene copolymers. Useful polypropylenes include, for example, polypropylene available from the Himont Corporation under the trade designation PC-973, polypropylene available from the Exxon Chemical Company under the trade designation Exxon 3445, and polypropylene available from the Shell Chemical Company under the trade designation DX 5A09.

Morman provides no teaching as to any particular benefit for using ethylene (or butylene) over any other "film forming polymers" such as the polyolefins that are taught.

In fact, Morman only teaches polypropylene as the neckable material in the Examples in columns 12-22.

More importantly, Morman does not teach any type of ethylene *characteristic* "etc." that would lead one skilled in the art to follow the Examiner's position.

In fact, the whole concept of an "ethylene characteristic" is unclear and lacking any support in Morman and Strack et al.

If one were to adopt the Examiner's position, one could just as well take the position that it would have been obvious to increase the amount of propylene or butylene or methyl pentene in order to increase the propylene or butylene or methyl pentene "characteristics" or even to decrease the

amount of ethylene or propylene or butylene or methyl pentene to decrease the "characteristics" of these components in the resulting material.

There is clearly no guidance for taking the Examiner's position or any similar position.

Accordingly, it is submitted that there is no basis for establishing "obviousness" as required under 35 U.S.C. §103.

That is, there is no suggestion or motivation within the teachings of Strack et al. or Morman that supports the Examiner's position on obviousness.

The Examiner has merely tried to establish that it would have been obvious to increase ethylene to increase the "characteristics similar to ethylene, etc."

The Examiner's attempt to identify a result effective variable in order to rely upon the teachings of in *In re Boesch* has not been successful.

The Examiner's readjusted position has strayed further from the basic principle that the prior art must provide a suggestion or motivation for combining and modifying the teachings of the prior art. It is that suggestion or motivation which is the essence of "obviousness."

The Examiner cannot merely isolate one of many components and take the position that it would be obvious to increase that component in order arbitrarily increase the characteristics of that component to the exclusion of others, especially when there if no guidance or teaching to do so.

As conceded by the Examiner, Strack et al. in view of Morman fails to teach that the inelastic material comprises ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight,

ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

There is no teaching within Strack et al. or Morman to select ethylene and butene and then increase the amount of ethylene as the Examiner purports.

It is only the Examiner's unsupported position that it would be obvious to increase ethylene to increase the "ethylene characteristics."

Even if the Examiner could point to some teaching in Morman that suggests the proposed increase in ethylene, the Examiner would still have to establish that the teaching were applicable to Strack et al.

Accordingly, the Examiner has not established the requisite obviousness needed to properly combine the teachings of Strack et al. and Morman and reject the claimed invention.

It is noted that the teachings of Morman are directed to a composite elastic material that requires "at least one necked material joined to [an] elastic sheet."

In contrast, Strack et al. does not teach a "necked material" but rather teaches a nonelastic textile webs such as webs of knit material, or woven material or scrim, having stretch and recovery characteristics that are laminated to a nonwoven elastomeric web.

In Morman the necked material is tensioned between S-roll arrangement 18 and pressure nip 40 (Fig. 1) so that it necks to a desired amount and then is held under tension while the elastic sheet is joined thereto.

After the resulting composite sheet is released from tension, the elastic sheet is allowed to contract and gather the necked material so that the bonded web attains its elasticity in that direction to the extent that the necked material allows the elastic sheet to elongate. (See column 6, lines 57-64)

The necked material which is required and critical in Morman is not taught by Strack et al.

In fact, Strack et al. teaches that the "upon relaxation of the stretch, the textile material does not gather." (See column 5, lines 66-67).

Strack et al. further teaches that the elastomeric nonwoven laminate is "substantially flat" when unstretched.

Note the title in Strack et al. is "FLAT ELASTOMERIC NONWONE LAMINATES".

In contract to Strack et al., Morman teaches a composite elastic material that includes a necked web that is "gathered between at least two" of the locations where the elastic sheet is joined to the necked material.

It follows from the differences between Strack et al. and Morman that there is no basis for using the necked materials of Morman in the laminates of Strack et al. especially since the necked materials of Morman create the formation of gathers which Strack et al. expressly avoids.

Moreover, there is no teaching in Morman as to an "ethylene characteristic" associated with the necked material that would translate into any obvious benefit in Strack et al.

It is further noted that neither Strack et al. nor Morman teach that their composite structures are stretched so as to change the dimensions of the fibers in a fibrous assembly and the elastic stretchability of the composite sheet as required by independent claims 1 and 6 or stretched within an

elasticity limit of the fibrous assembly and within a breaking extension of an elastic sheet as required by appellants' independent claim 6.

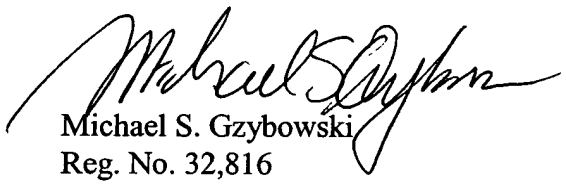
CONCLUSION

For the reasons advanced above, Appellant respectfully contends that the rejection of claims 1-3 and 7 as being obvious under 35 U.S.C. §103(a) over Morman is improper because the examiner has not met the burden of establishing a *prima facie* case of obviousness.

Reversal of the rejection on appeal is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 12-2136 and please credit any excess fees to such deposit account.

Respectfully submitted,



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133122.1

CLAIMS APPENDIX

Claim 1 (Previously presented): A stretchable composite sheet comprising:

an elastic sheet having a stretchability in at least one of two directions that are orthogonal to each other; and

a fibrous assembly in the form of a sheet having a stretchability in one of said at least two directions and joined to at least one surface of said elastic sheet, said fibrous assembly comprising a plurality of fibers and having an inelastic stretchability and being joined to said elastic sheet at binding spots to form a joined composite sheet structure which is thereafter stretched so as to change the dimensions of the fibers in the fibrous assembly and the elastic stretchability of the composite sheet, said binding spots being arranged intermittently along said two directions, said fibrous assembly comprising fibers that are curved between adjacent pairs of said binding spots along said one of said at least two directions, said fibers comprising ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight.

Claim 2 (Previously presented): The stretchable composite sheet according to Claim 1, wherein said fibers further comprise propylene homopolymer from greater than 0% to 90% by weight.

Claim 3 (Previously presented): The stretchable composite sheet according to Claim 1, wherein said elastic sheet and said fibrous assembly are heat-sealed with each other at said binding spots.

Claim 4 (Withdrawn): A process for making a stretchable composite sheet comprising the steps of:

a) providing a first web made of thermoplastic synthetic fiber and being inelastically stretchable in one direction, said first web being formed with fibers that comprise ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight and having a breaking extension of at least 150%;

b) providing a second web made of thermoplastic synthetic resin and being elastically stretchable at least in said one direction, said second web being elastically stretchable by at least 80% in said one direction;

c) continuously feeding said first web in said one direction;

d) continuously feeding said second web in said one direction and placing said second web upon said first web;

e) joining said first and second webs having been placed upon each other in step d) to each other intermittently in said one direction and in the direction orthogonal to said one direction, at least in said one direction;

f) stretching said first and second webs having been joined to each other in step e) in said one direction and said direction orthogonal to said one direction, at least in said one direction within an elasticity limit of said second web and within a breaking extension of said first web; and

g) allowing the first and second webs having been stretched in step f) contract to obtain said composite sheet.

Claim 5 (Withdrawn): The process according to Claim 4, wherein said first and second webs are stretched at least 80% in said step f).

Claim 6 (Previously presented): A stretchable composite sheet obtained by:

a) providing a first web made of a thermoplastic synthetic fiber and being inelastically stretchable in one direction, said web being formed from fibers that comprise ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or a mixture thereof at 100 -10% by weight and having a breaking extension of at least 150%;

b) providing a second web made of thermoplastic resin and being elastically stretchable at least in said one direction, said second web being elastically stretchable by at least 80% in said one direction;

c) continuously feeding said first web in said one direction;

d) continuously feeding said second web in said one direction and placing said second web upon said first web;

e) joining said first and second webs having been placed upon each other in step d) to each other intermittently in said one direction and in the direction orthogonal so said one direction, at least in said one direction to form a composite web;

f) stretching said first and second webs having been joined to each other in step e) in said one direction and said direction orthogonal to said one direction, at least in said one direction within an elasticity limit of said second web and within a breaking extension of said first web so as to change the dimensions of the fibers in the first web and the elastic stretchability of the composite web; and

g) allowing the first and second webs having been stretched in step f) contract to obtain said composite sheet.

Claim 7 (Previously presented): The stretchable composite sheet according to Claim 1, wherein said fibers comprise ethylene/propylene copolymer containing ethylene at 0.5 – 10% by weight, ethylene/propylene/butene containing ethylene at 0.5 – 10% by weight and butene at 0.5 – 15% by weight, or mixtures thereof at 100% by weight.

EVIDENCE APPENDIX

Exhibit "A," *In re Boesch and Slaney*, 205 USPQ 215 (CCPA 1980)

Exhibit "B" *Ex parte Roland Barth*, Appeal No. 1998-0982; Application No. 08/399,715 (Nov. 3, 1999)

321 (1974). While the $10,000 awarded plaintiffs in fees might be considered generous when compared with the amount recovered in damages, the fees do not appear unreasonable considering the amount of work necessitated and performed and the skill employed. See also Key West Hand Print Fabrics, 269 F.Supp. at 615-16, 155 USPQ at 132-133. There was no abuse here.

However, we deny plaintiffs' application for allowance of additional attorneys' fees on appeal. We assume counsel was familiar with the law, having made similar arguments in district court on all the issues raised on appeal. See Monogram Models, 492 F.2d at 1288, 181 USPQ at 429. The appeal was not frivolous. Plaintiffs did not prevail on their cross appeal. Equity considerations lead us to permit the parties to pay their own attorneys' fees in this court. The plaintiffs are entitled to costs.

Affirmed.

Court of Customs and Patent Appeals

In re Boesch and Slaney

No. 79-597

Decided Mar. 13, 1980

PATENTS

1. **Patentability — Invention — In general (§51.501)**

Patentability — Invention — Specific cases — In general (§51.5091)

Discovery of optimum value of result effective variable in known process is ordinarily within skill of art.

2. **Patentability — Composition of matter (§51.30)**

Patentability — Evidence of — In general (§51.451)

Patentability — Evidence of — Comparison with allowed claims or patents (§51.457)

Patentability — Invention — In general (§51.501)

Patentability — Invention — Specific cases — In general (§51.5091)

Prima facie case of obviousness may be rebutted where results of optimizing variable, which was known to be result effective, are unexpectedly good; proof of unexpected properties may be in form of direct or indirect comparative testing of claimed compounds and closest prior art.

3. **Patentability — Composition of matter (§51.30)**

Patentability — Evidence of — In general (§51.451)

Patentability — Evidence of — Comparison with allowed claims or patents (§51.457)

Patentability — Invention — Specific cases — Chemical (§51.5093)

Data that compares four examples of claimed alloys with one example of prior art alloy and is intended to show unexpected results are not commensurate in scope with claims for broad range of elements in case in which weight percent of elements in four examples of claimed alloys vary by relatively minor amounts, for example, entire claimed range of carbon is .18 percent, but tested range is only .02, and claimed cobalt range is 4.8, but test range is only 1.3, and there is no evidence showing whether other alloys encompassed by these broad claims and having elements varying by relatively major amounts also exhibit unexpected results.

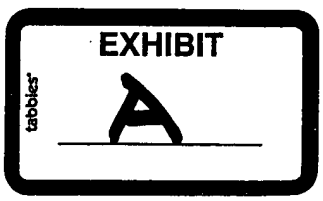
4. **Patentability — Composition of matter (§51.30)**

Patentability — Evidence of — In general (§51.451)

Patentability — Evidence of — Comparison with allowed claims or patents (§51.457)

Patentability — Invention — Specific cases — Chemical (§51.5093)

Test results involving single alloy within broad range claimed are not sufficient to support appellants' allegation of what would, from prior art, be unexpected under circumstances in which essential concept of invention is to maintain average number of electron vacancies at value not exceeding about 2.35, prior art teaches that reduction of Nv value reduces the chances of sigma phase in alloy, appellants allege that alloys meeting their composition and Nv value requirements are free from sigma phase, and appellants tested only one example of low Nv value alloy and found no sigma, which is result consistent with both prior art



teaching and appeallants' allegation that their claimed alloys are totally free from sigma phase; where it is alleged that certain technique for flipping coins would always produce "heads," one would hardly be persuaded by single toss of coin that resulted in showing of "heads."

Particular patents — Nickel Alloys

Boesch and Slaney, Temperature Nickel Based Alloy and Process of Making Same, rejection of claims 1 and 8-15 affirmed.

Appeal from Patent and Trademark Office Board of Appeals.

Application for patent of William J. Boesch and John S. Slaney, Serial No. 587,776, filed June 17, 1975. From decision rejecting claims 1 and 8-15, applicants appeal. Affirmed.

Robert F. Dropkin and Vincent G. Gioia, both of Pittsburgh, Pa., for appellants.

Joseph F. Nakamura (John W. Dewhirst, of counsel) for Commissioner of Patents and Trademarks.

Before Markey, Chief, Judge, Rich, Baldwin, and Miller, Associate, Judges, and Maletz,* Judge.

Miller, Judge.

This is an appeal from a decision of the Patent and Trademark Office ("PTO") Board of Appeals ("board") which sustained the examiner's rejection under 35 USC 103 of appellants' claims[1] 1 and 8-15 in view of Lamb[2] and Pohlman[3] et al. We affirm.

Invention

The invention embraces nickel base alloys consisting essentially of:

Metals	Percentage Ranges
aluminum	4.0 - 4.7
boron	0.005 - 0.03
carbon	0.0 - 0.18
chromium	13.7 - 15.3
cobalt	14.2 - 19.0
iron	0.0 - 4.0
molybdenum	3.8 - 4.8
titanium	3.0 - 3.7

The remainder of the alloys comprises nickel and incidental impurities. The elements in the alloys are balanced to provide an N_V[4] value not in excess of about 2.35[5] according to the following equation:

$$N_V = 4.66\ (A\%\ Cr + A\%\ Mo) + 1.71\ (A\%\ Co) + 0.61\ (A\%\ Ni)$$

In the case of alloys within the board range set forth above, but not balanced to meet the required Nv value, room temperature ductility deteriorates, and creep[6] deformation increases, after prolonged exposure at elevated temperatures. Appellants state that these results are attributable to formation of a deleterious phase (known as "sigma phase") in the metal after such exposure, and that the tendency of an alloy to form sigma phase is (unexpectedly) eliminated by balancing the relative amounts of its constituent elements in accordance with the N_V equation. Where the composition of an alloy has been controlled to provide an N_V value of about 2.35 or less, no sigma has been found after exposure at 1500°F for time periods up to 7200 hours.

Claim 1 is illustrative:

1. A nickel base alloy having a composition consisting essentially of up to 0.18% carbon from about 14.2% to about 19.0% cobalt, from about 13.7% to about 15.3% chromium, from about 3.8% to about 4.8% molybdenum, from about 3.0% to about 3.7% titanium, from about 4.0% to about 4.7% aluminum, up to about 4.0% iron, from 0.005% to about 0.03% boron and the balance essentially nickel with incidental impurities, the aforementioned elements being balanced to provide an N_V value not in excess of about 2.35 according to the following equation:

$$N_V = 4.66\ (A\%\ Cr + A\%\ Mo) + 1.71\ (A\%\ Co) + 0.61\ (A\%\ Ni)$$

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* The Honorable Herbert N. Maletz of the United States Customs Court, sitting by designation.

[1] Serial No. 587,776 was filed on June 17, 1975.

[2] U.S. patent No. 3,147,155, issued September 1, 1964.

[3] U.S. patent No. 3,457,066, issued July 22, 1969.

[4] N_V refers to the average electron vacancy concentration per atom in the matrix of the alloy.

[5] Appellants state that the overall variation in N_V due to chemical uncertainty is +0.25 so that in reality the N+value of about 2.35 may actually extend from 2.32 to 2.38.

[6] Appellants' specification states that A% "refers to the atomic percent of the element so described."

[7] Creep is the permanent deformation of a metal that occurs as a result of prolonged compression or extension at or near room temperature. The Condensed Chemical Dictionary 228 (8th ed. 1971).

the alloy being characterized by its freedom from precipitation of deleterious amounts of sigma-like phase after exposure at temperatures in excess of 1500°F for periods of time in excess of 1000 hours.

Prior Art

Lamb discloses a process for hot working age-hardenable nickel-chromium alloys. The alloys contain:

Metals	Percent by Weight
aluminum	4.0 - 5.4
boron	0.003 - 0.1
chromium	14.0 - 16.0
carbon	0.01 - 0.2
cobalt	14.0 - 25.0
molybdenum	3.0 - 5.5
titanium	3.0 - 4.6
zirconium	0.01 - 0.2

A sample alloy is heated at 1190°C for 1.5 hours and cooled to 1000°C at about 1°C per minute, after which it may be hot worked at 1120°C. When hot working is complete, the alloy will generally require a further heat treatment to develop full creep resisting properties.

Pohlman et al. disclose nickel base alloys suitable for elevated temperature operation containing:

Metals	Percent by Weight
aluminum	4.2 - 4.6
boron	0.025 - 0.035
carbon	0.04 - 0.07
chromium	14.5 - 15.5
cobalt	14.5 - 15.5
molybdenum	4.5 - 5.5
titanium	3.3 - 3.7

The remainder of the alloys essentially comprises nickel and incidental impurities; possibly, also, small amounts of silicon and manganese.

Both references are silent regarding an N_V value requirement, although Lamb requires "a total aluminum and titanium content from about 7.75% to about 9.5%," and Pohlman et al. "prefer abot 14.5-15.5 percent by weight cobalt because that range results in the best balance at elevated temperatures between such properties as tensile and rupture strengths, oxidation resistance and the ability of the sheet material to be formed or worked."

The Boesch Affidavit

Seven heats of alloys (appellants' Table I below), which were within the claimed composition ranges but whose N_V values varied from 2.40 to 2.54 (all clearly above the upper limit of 2.35 set forth in the claims), were processed and heat treated. Appellants' Table II shows that all seven heats contained sigma phase.

TABLE I

CHEMISTRY-WEIGHT PERCENT

Heat No.	C	Cr	Ni	Co	Fe	Mo	Ti	Al	B	N_V
D1-379-1	0.01	15.3	Bal.	17.9	--	4.5	3.6	4.7	0.023	2.53
D1-379-2	0.04	15.3	Bal.	17.9	--	4.6	3.6	4.7	0.022	2.54
D1-380-1	0.06	15.3	Bal.	17.5	1.0	4.6	3.6	4.7	0.021	2.51
D1-380-2	0.06	15.1	Bal.	17.4	3.5	4.5	3.5	4.6	0.020	2.40
D1-382	0.06	15.3	Bal.	18.5	--	4.3	3.5	4.4	0.019	2.47
D1-383	0.06	15.2	Bal.	17.7	--	4.3	3.6	4.4	0.020	2.43
D1-386	0.06	15.3	Bal.	18.1	--	4.7	3.4	4.6	0.021	2.49

TABLE II

Heat No.	Approximate w/o Sigma
D1-379-1	1.4
D1-379-2	0.9
D1-380-1	0.4
D1-380-2	0.05
D1-382	0.05
D1-383	0.3
D1-386	0.3

The affidavit states that "any amount of sigma phase is deleterious and undesirable because of the susceptibility to embrittlement failure following exposure to high temperature."

The Board

The board agreed with the examiner that the claimed alloys were prima facie obvious from the prior art, noting that there was no substantial disagreement that both Pohlman et al. and Lamb disclose alloys having compositional limits overlapping those of the claimed alloys. Although disagreeing with the examiner's contention that there was no evidence to support the statement in the Boesch affidavit that "any amount of sigma phase is deleterious and undesirable," it agreed with the examiner that the Boesch affidavit was insufficient to overcome the prima facie case of obviousness because there was no evidence showing:

> (1) the precise amounts of sigma-like phase present in compositions containing Appellants' claimed components balanced to provide Nv values just inside versus just outside Appellants' claimed "about 2.35" N_v limits; and (2) direct comparisons of sufficient mechanical properties of those compositions within and without the claimed limit, to demonstrate the alleged critical correlation of Nv limit with sigma phase content.*

The board also said that the showing (in the specification, set forth infra) did not establish the asserted criticality in selection of the components of the alloys according to the claimed N_v forumla, because the alloys failed to meet the claimed compositional and N_v value requirements.

Opinion

The Prima Facie Case

Each of the ranges of constitutents in appellants' claimed alloys overlaps ranges disclosed by Pohlman et al. and Lamb. Appellants, citing In re Waymouth, 499 F.2d 1273, 182 USPQ 290 (CCPA 1974), argue that neither of the cited prior art references recognizes the problem solved by them and, therefore, cannot render the claims obvious. Upon examination of the prior art references, we do not agree. Appellants admitted in their specification that:

> It has been postulated according to Pauling's theory that the criterion for the formation of sigma phase is based upon the number of electron vacancies (N_v) in the bonding orbitals of the elements involved. Based thereon, other investigators have derived an empirical equation which includes the elements chromium, molybdenum, manganese, iron, cobalt and nickel. It is to be noted, however, that the nickel base alloys to which reference is made in the present invention relate to an iron-free or low-iron composition, with only incidental amounts of an element such as manganese, and are hardened by the aluminum and titanium rich intermetallic compound gamma prime.

U.S. patent No. 3,837,838 ('838), filed December 18, 1972, and issued September 24, 1974, was introduced into evidence by appellants and further illuminates what is meant by "Pauling's theory":

> As described in an article by Linus Pauling entitled "The nature of interatomic forces in metals," published in Physical Review, 54:899, 1938, in a given metallic atom, the outer most orbitals, termed the bonding orbitals, are occupied by the bonding electrons responsible for bonding the atom to its neighboring metallic atoms. At a given instant in time and on the average, the bonding orbitals

* The board agreed with the examiner that "there [was no evidence showing] that an alloy having an N_v number of 2.35 is free of any amount of sigma phase, or what the sigma phase content and properties are of an alloy having an N_v number of 2.36 which is close to but outside the N_v requirement."

are only partially occupied by the bonding electrons. Such partial occupation means that the outer orbitals are partially vacant of electrons or possess an "electron hole." The total average number of vacant orbitals in a given metallic atom is called the electron hole number of the metal (N_v). The average electron hole number (N_v) is the resultant of adding all Nv for the participating elements in the alloy matrix. The higher the N_v of a given Co-Cr-Ni alloy the higher the chance for the precipitation of embrittling phases. The quantities of metals consumed in precipitation do not enter in calculating N_v of the alloy matrix and hence do not participate in the formation of embrittling phases. A low N_v may thus be obtained by either choosing elements of low N_v to form an alloy or by using elements that will react in the alloy and precipitate out from the alloy matrix.

Accordingly, in carrying out this invention, I have selected an alloy-base for the system which possesses a low N_v, and have strengthened the alloy base by adding elements which will have minor or no effect on raising the N_v through controlling their percentage as solutes or by eliminating their effect on N_v by formation of compounds which precipitate out.

It appears from appellants' specification that certain precipitate-hardened nickel base alloys, after being exposed to elevated temperatures for prolonged periods of time, suffered "from a marked and catastrophic decrease in room temperature ductility and a marked increase in the rate of creep deformation." It was observed that other nickel base alloys having the same percentage ranges of components did not suffer such deleterious changes. The cause of the problem was believed to be the formation of an embrittling phase ("sigma"). As early as 1938, however, it was known that the higher the N_v value of a Co-Cr-Ni alloy, the higher the chance for precipitation of embrittling phases; also, that the quantities of metals consumed in precipitation did not enter into calculating the N_v value of an alloy matrix. We are persuaded that one of ordinary skill in the art would have been guided by these principles.

[1] In the above-quoted passage from '838, we note that lowering the N_v value of a Co-Cr-Ni alloy and deletion of the metals not consumed in precipitation from the N_v calculation are expressly suggested. Considering, also, that the composition requirements of the claims and the cited references overlap, we agree with the Solicitor that the prior art would have suggested "the kind of experimentation necessary to achieve the claimed composition, including the proportional balancing described by appellants' Nv equation." This accords with the rule that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); In re Aller, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955). Accordingly, we conclude that a prima facie case of obviousness has been established.

Unexpected Results

[2] It is well settled that a prima facie case of obviousness may be rebutted "where the results of optimizing a variable, which was known to be result effective, [are] unexpectedly good." In re Antonie, supra, 559 F.2d at 620, 195 USPQ at 8-9, and cases cited therein. It is also well settled that proof of unexpected properties may be in the form of direct or indirect comparative testing of the claimed compounds (here, alloys) and the closest prior art. In re Payne, 606 F.2d 303, 316, 203 USPQ 245, 256, (CCPA 1979), and cases cited therein.

A. Creep Tests

Table V, set forth in appellants' specification and shown below, compares four examples of the claimed alloys with one example (6-3211) of a prior art alloy and is intended to show that the measured creep of the claimed alloys is unexpectedly less than that of the prior art.

TABLE V

Creep Tests at 1500°F and 37,000 psi

Alloy No.	Sample Removed After (Hours)	Measured Creep (inches per inch)
2-1422	1567.8	0.008
2-1423	1500.4	0.004
2-1425	1504.5	0.010
2-1426	1500.4	0.004
6-3211	1505.1	0.034

The measured creep of 6-3211 — an alloy, appellants note, having "chemistries" within those of the references — is in excess of three to eight times greater than the creep of the claimed alloys.

The composition and N_V values of the alloy heats in Table V are as follows:

Alloy No.	Element, Weight %								N_V Value
	C	Al	Ti	Mo	Cr	Co	B	Ni	
2-1422	0.07	4.20	3.23	4.79	14.7	18.0	0.030	bal.	2.32
2-1423	0.06	4.37	3.45	4.45	14.6	17.6	0.028	bal.	2.36
2-1425	0.06	3.91	2.98	4.40	14.8	17.5	0.028	bal.	2.21
2-1426	0.05	4.20	3.19	4.50	14.5	17.5	0.030	bal.	2.27
6-3211	0.06	4.43	3.54	4.95	15.2	18.8	0.030	bal.	2.51

Although it is apparent that the molybdenum content of 6-3211 exceeds the maximum content of the claimed alloys by 0.15%, it is clearly within the ranges of the Pohlman et al. and Lamb alloys.

[3] However, we are not persuaded that the Table V data are commensurate in scope with appellants' claims. In re Greenfield, 571 F.2d 1185, 1189, 197 USPQ 227, 230, (CCPA 1978).[9] Appellants claim broad ranges of elements, but the weight percent of elements in the four examples of the claimed alloys vary by relatively minor amounts. For example, the entire *claimed* range of carbon is .18 percent, but the *tested* range is only .02 (.07 minus .05); the claimed cobalt range is 4.8, but the test range is only 1.3. There is no evidence showing whether other alloys encompassed by appellants' broad claims and having elements varying by relatively major amounts also exhibit a low creep rate.

B. Ductility Test

Appellants' Table VI, set forth in their specification, compares the room temperature ductility of one heat of the claimed alloy (2-1426) and one heat of an alloy (6-3266) which appellants state has "chemistries" within those of the references.

TABLE VI

Room Temperature Tensile Tests

Alloy No.	Condition	U.T.S. psi	0.2% Offset Y.S. (psi)	Elong. (%)	R.A. (%)	Nv Value
2-1426	As-heat-treated	204,000	140,000	16.9	15.0	2.27
2-1426	As-heat-treated + exposed 5000 hrs. at 1500°F	157,000	100,000	16.1	14.1	2.27
6-3266	As-heat-treated	194,500	136,800	14.0	13.7	2.52
6-3266	As-heat-treated + exposed 5000 hrs. at 1500°F	150,500	117,500	5.0	5.5	2.52

The marked decrease in room temperature ductility (Elong.) after prolonged elevated temperature exposure of the prior art alloy (6-3266), compared to the claimed alloy's (2-1426) essentially unchanged ductility, is contended to show an unexpected result, as was the improvement in measured creep discussed earlier. However, for the same reason that the measured creep test data of Table V are not persuasive of unexpected results, we do not regard the tensile test data of Table VI, comparing only one heat of a claimed alloy, sufficient to rebut the prima facie case of obviousness of the claimed invention.

C. Absence of Sigma Phase

Throughout prosecution appellants have maintained that the claims define "a nickel base alloy which can be manufactured in a consistent way to remain free from a tendency to form plate-like sigma phase." The "essential concept of the present invention [is] to maintain the average number of electron vacancies at a value not exceeding about 2.35." Whereas the Pauling theory teaches that a low N_V value means *reduced chances* for sigma phase, appellants allege that alloys meeting their composition and N_V value requirements are *free* from sigma phase.

[4] As related earlier, the Boesch affidavit shows that sigma phase is present in

[9] It is unnecessary to decide whether 6-3211 is the "best prior art." See In re Malagari, 499 F.2d 1297, 1302-03, 182 USPQ 549, 552-53 (CCPA 1974).

seven alloy examples, all of which meet the composition requirements but exceed the N_V value requirement of the claimed alloys. However, this affidavit contains no examples of claimed alloys showing the absence, or presence, of sigma. The remainder of the record reveals only a single example of the claimed alloy, which shows the absence of sigma.[10] Appellants' specification includes a photomicrograph of Table V alloy heat 2-1422, which clearly shows the absence of sigma; also, a photomicrograph of Table V alloy heat 6-3211, which shows the presence of sigma. We note again that the prior art teaches that reduction of the N_V value *reduces the chances* of sigma phase in the alloy. Here appellants tested only one example of a low N_V value alloy and found no sigma — a result consistent with both the prior art teaching and appellants' allegation that their claimed alloys are "totally *free* from sigma phase."[11] Under such circumstances, test results involving a single alloy within the broad range claimed are not sufficient to support appellants' allegation of what would, from the prior art, be unexpected.[12]

In view of the foregoing we hold that appellants have failed to rebut the prima facie case of obviousness.

The decision of the board is *affirmed*.

Affirmed.

[10] Thus, appellants have again failed to show test data commensurate in scope with the broad claims.

[11] We agree with the board that the six United States patents ((1) No. 4,093,474, issued June 6, 1978; (2) No. 4,083,734, issued April 11, 1978; (3) No. 3,930,904, issued January 6, 1976; (4) No. 3,837,838, issued September 24, 1974; (5) No. 3,816,110, issued June 11, 1974; and (6) No. 3,767,385, issued October 23, 1973) introduced into the record by appellants "do support the assertion in the Boesch affidavit that 'any amount of sigma phase' is undesirable." Therefore, we have limited our analysis to the issue of the existence of sigma phase and have not extended it to include the effect of varying amounts of sigma phase.

[12] Where it is alleged that a certain technique for flipping coins would always produce "heads," one would hardly be persuaded by a single toss of a coin which resulted in a showing of "heads."

Court of Customs and Patent Appeals

In re Breslow

No. 79-602
Decided Feb. 28, 1980

PATENTS

1. Patent grant — In general (§50.01)

Patent grant — Nature of patent rights — In general (§50.201)

Government grants only right to exclude; there is no other agreement; analogy of a patent to a contract on theory that it is issued in exchange for invention's disclosure, "consideration," is inexact; patent is statutory right; it is granted to "Whoever" fulfills conditions, Section 101, unless fraud has been committed.

2. Court of Customs and Patent Appeals — Issues determined — Ex parte patent cases (§28.203)

Question of whether claimed compounds "are even formed" on which point Board of Appeals disagreed with examiner who argued that there was no indication nor proof on this point and board expressly held to contrary is not before Court of Customs and Patent Appeals.

3. Patentability — Subject matter for patent monopoly — In general (§51.601)

Ex parte Howard, 328 O.G. 251, 1924 C.D. 75, dealt with construction of "manufacture" rather than "composition of matter," with gob, of at least obvious, molten glass in transitory state rather than with novel chemical compounds, and with mechanical molding process in which it was well known to use molten gob of glass as distinguished from novel chemical process using entirely new and unobvious group of chemical compounds.

4. Patentability — New use or function — Composition of matter (§51.555)

Patentability — Subject matter for patent monopoly — In general (§51.601)

In re Stubbs, 13 USPQ 358, did not deal with issue of whether claimed compounds are excluded from category of "composition of matter" in Section 101 merely because they are transitory, unstable, and non-isolatable.

5. Patentability — New use or function — Composition of matter (§51.555)

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROLAND BARTH

Appeal No. 1998-0982
Application No. 08/399,715[1]

HEARD: November 3, 1999

Before McCANDLISH, Senior Administrative Patent Judge, FRANKFORT, and McQUADE, Administrative Patent Judges.

McCANDLISH, Senior Administrative Patent Judge.

DECISION ON APPEAL

AND

REMAND TO THE EXAMINER

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[1] Application for patent filed March 3, 1995.

This is a decision on an appeal from the examiner's final rejection of claims 1 through 20.[2] No other claims are pending in the application.

Appellant's invention relates to "an arrangement for the relative adjustment of the rotation angle of a control shaft [2] with respect to a driving wheel [4], particularly for an internal combustion engine" (specification, page 1). An element (10) having one set of teeth engaging teeth on the driving wheel (4) and another set of teeth engaging teeth on a part (8) fixed to the control shaft (2) is axially displaceable to angularly adjust the driving wheel with respect to the control shaft. In the illustrated embodiment, the control shaft has a flange (11) disposed on one side of the driving wheel to act as a stop for limiting axial movement of the driving wheel in one direction. On the other side of the driving wheel there is a stop ring (12), a prestressed diaphragm spring (15) and a wear ring (16). The wear ring seats against a side face of the driving wheel, and the diaphragm spring is confined between the stop ring and the wear

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[2] Claim 1 has been amended subsequent to the final rejection.

ring. With this arrangement, the diaphragm spring exerts a biasing force to establish engagement between the driving wheel and the stop flange (11) on the control shaft.

According to claim 1, the only independent claim on appeal, the diaphragm spring has "a characteristic curve whose shape is relatively negative and substantially constant along a maximal movement path of the predetermined operating range."

A copy of the appealed claims is appended to appellant's brief.

The following reference is relied upon by the examiner as evidence of obviousness in support of her rejection under 35 U.S.C. § 103:

German Patent Barth et al. (Barth)[3]	DE 42 33 250	Jan. 20, 1994

Claims 1 through 20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Barth. The examiner concedes that Barth lacks a disclosure of the claimed negative spring characteristic. She nevertheless concludes:

> It would have been obvious to one of ordinary skill in the art, as determined through routine

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[3] Translation attached.

> experimentation and optimization, to provide a spring having the characteristics which are claimed because since it is well known that one of skill in the art would routinely experiment to choose a spring which would best allow for the characteristics which are required of the shaft.

To the extent that the language in appealed claim 1 is understandable, we cannot sustain the standing § 103 rejection. Admittedly, there are cases which have held that "optimization" may not in itself patentably distinguish the claimed subject matter over the prior art. However, in all of the authorities known to us, the optimization relates to a range or a variable. See, for example, In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (The discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art and, hence, obvious.).

In the case at bar, appellant's claimed diaphragm spring is required to be structurally different from Barth's diaphragm spring in order to provide the negative slope characteristic. Thus, in the present case, patentability of appellant's claimed invention is predicated on a difference in structure, and not on a change in a variable. The rule in Boesch therefore is not applicable to the present case, especially in view of the fact

that the examiner has not cited any authority for extending the Boesch principle concerning changes in a variable to a situation in which an apparatus has been structurally modified to achieve a certain result.

The examiner's decision rejecting appealed claims 1 through 20 is therefore reversed.

This application is herewith remanded to the examiner to review the claimed subject matter for compliance (a) with the description requirement in the first paragraph of 35 U.S.C. § 112 and (b) with the second paragraph of 35 U.S.C. § 112.

With regard to the first paragraph of § 112, certain limitations in claim 1 appear to lack descriptive support in the original specification, the original claims or the original drawings. In particular, appellant's application as filed lacks descriptive support for the recitation in claim 1 that the axial stops (in the plural) are "frictionally engageable with the driving wheel." Of the two axial stops described in the original specification and shown in the original drawings, namely the control shaft flange 11 and the stop ring 12, only

the control shaft flange is engageable[4] with the driving wheel. Furthermore, appellant's application as filed appears to lack descriptive support for the recitation in claim 1 that diaphragm spring has an operating range "to move at least one of the axial stops into frictional engagement with the driving wheel, . . ."

With regard to the second paragraph of § 112, the examiner's attention is directed to the recitation in claim 1 that the shape of spring's characteristic curve is "relatively negative and substantially constant along a maximal movement path of the predetermined operating range" (emphasis added). It is unclear what is meant by the recitation that the movement path (which we understand to be the spring's deflection path) is "maximal." Furthermore, the word "substantially" is a term of degree. Appellant's specification, however, appears to lack any guidelines or standards for measuring that degree as required in Seattle Box Co. v. Industrial Crating & Packing Inc., 731 F.2d 818, 826, 221 USPQ 568, 574 (Fed. Cir. 1984).

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[4] According to its applicable dictionary definition (see Webster's Third New International Dictionary (G. & C. Merriam Company, 1971)), the word "engage" means to "come into contact with."

REVERSED AND REMANDED

HARRISON E. McCANDLISH)
Senior Administrative Patent Judge)

CHARLES E. FRANKFORT) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND
) INTERFERENCES

JOHN P. McQUADE)
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